**Energy Notes**

<https://www.youtube.com/watch?v=AnuLW0ZX7-Q>

**Definitions:**

Energy –

**Energy:** is that which allows work to be done and as that which causes change. **(SI Unit for Energy = Joule (J))**

Mechanical Energy-
**Mechanical energy (ME) = all KE + all PE in an object. Since the object’s total ME must be conserved, the KE used to place a book on a shelf is stored in the book as PEG. The total ME remains constant**

Potential Energy (gravitational)-
**Gravitational Potential Energy (PEG) is energy of position**. When work is done on an object to lift it to a certain height above the ground or any other reference point, it is given **gravitational potential energy (PEG)**. PEG is the potential energy of an object due to its position relative to another object.

Potential Energy (elastic) –
**energy stored in a spring.** When work is done on a spring to compress it or stretch it, it is given **elastic potential energy (PEe)** or **stored** **potential energy**. **PEe is the potential energy stored in a stretched or compressed spring.**

Kinetic Energy –
**energy of motion**. When an object is allowed to fall, gravity does work on the object, causing it to fall. As the object speeds up during its fall, it gains **kinetic energy.** An object in motion has undergone a change to start moving. Therefore, it received kinetic energy when it started moving.

In the process of gaining KE as it falls, the object loses an equal amount of PEG. When it loses PEG and gains KE in equal amounts as it falls, total mechanical energy (ME) is conserved.

**Formulas and examples:**

Potential Energy (gravitational)

PEG = \_gravitational potential energy\_\_\_\_\_ measured in \_\_Joules (J)\_\_\_\_\_\_­­\_\_\_\_
 m = \_\_\_\_mass \_\_\_\_\_\_\_\_\_\_\_ measured in \_\_\_Kilograms (kg)\_\_\_\_\_
 g = \_\_\_\_ Gravity \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ measured in \_\_\_9.8 m/s2\_\_\_\_\_\_\_\_\_\_
 h = \_\_\_\_ height \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ measured in \_\_\_meters (m) \_\_\_\_\_\_\_

Example:
Jake is holding a 10 kg weight above his head at 2.5m. Before he drops the weight, what is the gravitational potential energy of the system?

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| Formula: | Plug in numbers:  | Answer: |

Potential Energy (elastic)

PEe = \_\_\_Elastic potential energy\_\_\_\_\_\_\_\_ measured in \_\_Joules (J)\_\_\_\_\_\_\_\_\_\_
 k = \_\_\_\_\_Spring Constant\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ measured in \_\_\_N/m\_\_\_\_\_\_\_\_\_\_\_
 x = \_\_\_\_\_distance spring is stretched\_\_\_\_\_\_ measured in \_\_\_m\_\_\_\_\_\_\_\_\_\_\_\_\_\_
Example:
If a spring has a spring constant of 400 N/m, how much energy is required to stretch the spring 0.25m from its undisturbed position?

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| Formula: | Plug in numbers:  | Answer: |

Kinetic Energy-

KE= \_\_\_\_kinetic energy\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ measured in \_\_\_\_Joules (J)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 m = \_\_\_\_\_mass\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ measured in \_\_\_\_kg\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 v = \_\_\_\_\_\_velocity\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ measured in \_\_\_\_\_m/s\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Example:
Jake drops the 10 kg weight he was holding above his head. What is the kinetic energy just before it lands if the weight is traveling at 7m/s?

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| Formula: | Plug in numbers:  | Answer: |